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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/629,806	07/30/2003	Miwa Kozawa	030923	9494
38834	7590	04/29/2005	EXAMINER	
WESTERMAN, HATTORI, DANIELS & ADRIAN, LLP 1250 CONNECTICUT AVENUE, NW SUITE 700 WASHINGTON, DC 20036			LEE, SIN J	
			ART UNIT	PAPER NUMBER
			1752	

DATE MAILED: 04/29/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/629,806

Applicant(s)

KOZAWA ET AL.

Examiner

Sin J. Lee

Art Unit

1752

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 February 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

1. Due to new grounds of rejections, the following rejections are made non-final.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-5, 9-15, and 20 are rejected under 35 U.S.C. 102(b) as being anticipated by Suetsugu et al (US 6,329,119 B1) (with Tsukahara et al (6,048,637) which is cited to here to support the Examiner's assertion that Suetsugu's polyvinyl phenol resin is water-soluble).

Suetsugu teaches (see col.2, lines 30-45) a resist material that includes a basic compound of Formula (I) which is shown in col.2, lines 12-20, an alkali soluble resin, and crosslinking agent. In Formula (I), X can be either N atom or C(NH₂) (see col.2, lines 24-25). Since there are only two choices for X, one of ordinary skill in the art would immediately envisage X to be C(NH₂). Therefore, the prior art teaches present amine compound of claim 3. Because Suetsugu teaches all of present components of claim 1, it is the Examiner's position that the prior art's resist material would inherently be capable of being used as a resist pattern thickening material. Therefore, the prior art teaches present inventions of claims 1-4. Also, Suetsugu's resist composition is used for lithography process for making semiconductor integrated circuits (see col.1, lines 4-8), and Suetsugu forms a resist pattern using his resist composition (col.8, lines 12-29).

Therefore, the prior art also teaches present invention of claim 20 (it is to be noted that present claim 20 is written in product-by-process claim language).

With respect to present claim 5, Suetsugu teaches (col.7, lines 55-59) that his resist composition can contain a surfactant. Therefore, the prior art teaches present invention of claim 5.

With respect to present claim 9, as one of three preferred examples for the crosslinking agents, Suetsugu discloses hexamethoxymethyl*melamine* (see col.7, lines 1-13). Therefore, Suetsugu teaches present invention of claim 9.

With respect to present claims 10 and 11, Suetsugu teaches (col.4, lines 10-14) that as his alkali soluble resin, a novolak resin and a polyvinyl phenol resin (such as homopolymer of vinylphenol) can be used in combination. As evidenced by Tsukahara et al, col.12, lines 7-11, polyvinyl phenol resin is water-soluble. Therefore, the prior art teaches present polyphenol compound of claim 11 (which is present water-soluble aromatic compound of claim 10). Therefore, the prior art teaches present inventions of claims 10 and 11.

With respect to present claims 12 and 13, Suetsugu teaches (col.4, lines 33-35) that for the polyvinylphenol resin, those in which the phenolic hydroxyl group is partially alkyl-*etherified* is preferable from the viewpoint of sensitivity. Therefore, the prior art teaches present polyvinyl aryl ether resin of claim 13. Therefore, the prior art teaches present inventions of claims 12 and 13.

With respect to present claims 14 and 15, Suetsugu discloses ketone solvents as one of the examples for his solvent (see col.7, lines 60-67, col.8, lines 7-9). Therefore, the prior art teaches present inventions of claims 14 and 15.

Claim Rejections - 35 USC § 103

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

5. Claims 6 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suetsugu et al (US 6,329,119 B1) in view of Shimada et al (US 6,416,939 B1).

Although Suetsugu teaches that his resist composition can contain a surfactant, the prior art is silent as to what kind of surfactants can be used. Non-ionic surfactants such as polyoxyethylene nonylphenyl ether are known in the art to improve stability of a negative type image recording material to treatment in regard to development conditions, as evidenced by Shimada, col.47, lines 10-19. Therefore, in view of Shimada, it would have been obvious to one of ordinary skill in the art to use non-ionic surfactants such as polyoxyethylene nonylphenyl ether as Suetsugu's surfactant in order to improve stability of Suetsugu's negative type resist composition to development conditions. Therefore, Suetsugu in view of Shimada would render obvious present inventions of claims 6 and 7.

6. Claims 1-10, 12, and 14-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ishibashi et al (US 6,579,657 B1) in view of Vasta (4,572,870).

In col.2, lines 38-57, Ishibashi teaches a method for manufacturing a semiconductor device: A first resist pattern is formed from a first resist (a mixture of

novolac resin and a naphthoquinonediazide photosensitive agent) on a semiconductor base layer. A second resist is formed on the first resist pattern which generates crosslinking reaction in the presence of an acid. A crosslinked film is formed at a portion of the second resist contacting with the first resist pattern by the agency of an acid fed from the first resist pattern. Non-crosslinked portions of the second resist are removed (i.e., developed) to form a second resist pattern. Finally, the semiconductor base layer is subjected to etching through the second resist pattern used as a mask. Ishibashi teaches (see col.2, lines 31-38, lines 62-65) as the second resist material, a fine pattern-forming material, which is a *mixture of water-soluble* resin such as polyvinyl alcohol or polyvinyl acetal and a crosslinking agent such as a melamine derivative or a urea derivative.

Ishibashi's second resist does not contain a nitrogen-containing compound. Vasta teaches a coating composition comprising a resin, a curing agent, and a bicyclic amidine (a nitrogen containing compound) (col.1, lines 41-62). Vasta states (col.1, lines 35-40) that such coating composition is stable against weather, corrosion and abrasion and specifically states (col.4, lines 32-36) that the bicyclic amidine significantly extends the pot life of the composition. Based on this teaching, it would have been obvious to one of ordinary skill in the art to include a nitrogen containing compound such as Vasta's bicyclic amidine in Ishibashi's second resist composition in order to stabilize the second resist composition and to increase the pot life of the second resist composition. Therefore, Ishibashi in view of Vasta would render obvious present inventions of claims 1, 2, 4, 8, 9, 16-21.

With respect to present claim 3, Vasta teaches that the bicyclic amidine can be replaced with a strong organic base such as tertiary alkyl ammonium hydroxide. Since the prior art teaches the equivalence of bicyclic amidine and tertiary alkyl ammonium hydroxide, it would have been obvious to one of ordinary skill in the art to use a tertiary alkyl ammonium hydroxide in Ishibashi's second resist composition in order to stabilize the second resist composition and to increase the pot life of the second resist composition. Therefore, Ishibashi in view of Vasta would render obvious present invention of claim 3.

Ishibashi teaches (col.9, lines 6-12) that in order to improve the film-forming properties, surface active agents such as non-ionic polyoxyethylene nonylphenyl ether type surfactant can be added to the second resist material. Therefore, Ishibashi in view of Vasta would render obvious present inventions of claims 5-7.

With respect to present claims 10 and 12, Ishibashi teaches (col.7, lines 34-50) that as his *water-soluble* resin for the second resist, polyacrylic acid, polyvinyl acetal, polyvinylpyrrolidone, polyvinyl alcohol, polyethyleneimine, polyethylene oxide, styrene-maleic acid copolymer, polyvinylamine resin, polyallylamine, oxazoline group-containing resins, water-soluble melamine resins, water-soluble urea resins, alkyd resins, and sulfone amide resins can be used and that the water-soluble resins may be used singly or *in combination of two or more*. Therefore, it would have been obvious to one of ordinary skill in the art to use the combination of polyvinyl acetal (or polyvinyl alcohol) and styrene-maleic acid copolymer as Ishibashi's water soluble resin for the second resist with a reasonable expectation of obtaining a material for finely isolated resist

patterns capable of reducing an isolation size or hole size in the pattern when the resist pattern is formed in a semiconductor manufacturing process. Since the styrene-maleic acid copolymer is water soluble aromatic compound as well as a resin containing an aromatic compound in a portion thereof, Ishibashi in view of Vasta would render obvious present inventions of claims 10 and 12.

Ishibashi teaches (col.9, lines 14-22) that the solvents for the second resist may be water and alcoholic solvents. Therefore, Ishibashi in view of Vasta would render obvious present invention of claim 14 and 15.

Double Patenting

7. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

8. Claims 1-12 and 14-21 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-4, 7, 8, 11, 15-20, 24-29, 31, and 34 of copending Application No. 10/909,888. Although the conflicting claims are not identical, they are not patentably distinct from each other because of the following reasons:

Claims 1, 2 and 15 of App.'888 teach a resist pattern thickening material (which is water-soluble and/or alkali-soluble) comprising a resin, a phase transfer catalyst and a crosslinking agent. As one of the examples for the phase transfer catalyst, App.'888 teaches quaternary ammonium salt (see claims 3 and 4). It would have been obvious to one of ordinary skill in the art to use the quaternary ammonium salt as the phase transfer catalyst with a reasonable expectation of obtaining a resist pattern thickening material. Therefore, App.'888 would render obvious present inventions of claims 1-4.

Claims 17-19 of App.'888 render obvious present inventions of claims 5-7.

Claim 11 of App.'888 renders obvious present invention of claim 8. Claim 16 of App.'888 renders obvious present invention of claim 9. Claims 20, 24, and 25 of App.'888 render obvious present inventions of claims 10 and 11.

Claims 7 and 8 of App.'888 teach that the resin of claim 1 can have aromatic structure. Therefore, App.'888 renders obvious present invention of claim 12.

Claims 26 and 27 of App.'888 render obvious present inventions of claims 14 and 15.

Claims 28, 29, 31, and 34 of App.'888 render obvious present inventions of claims 16-21.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

9. Claims 1-21 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 5, 6, 8, 9, 13-15, 19-24, 26, and 27 of copending Application No. 10/623,679. Although the conflicting

claims are not identical, they are not patentably distinct from each other because of the following reasons:

Claim 1 of App.'679 states the following:

1. A resist pattern thickening material comprising:
a resin;
a crosslinking agent; and
at least one of a cationic surfactant, an amphoteric surfactant, and a non-ionic surfactant selected from an alkoxylate surfactant, a fatty acid ester surfactant, an amide surfactant, an alcohol surfactant, and an ethylene diamine surfactant.

Based on this teaching, it would have been obvious to one skilled in the art to use an *amide* surfactant or an ethylene *diamine* surfactant with a reasonable expectation of obtaining a resist pattern thickening material. Therefore, claim 1 of App.'679 renders obvious present inventions of claims 1-3.

Claim 5 of App.'679 renders obvious present invention of claim 4.

Since claim 1 of App.'679 teaches that more than one surfactant can be used in the resist pattern thickening material, it would have been obvious to one of ordinary skill in the art to use an amide surfactant (or an ethylene diamine surfactant) together with an alcohol surfactant with a reasonable expectation of obtaining a resist pattern thickening material. Therefore, Claim 1 of App.'679 renders obvious present inventions of claims 5-7.

Claim 6 of App.'679 renders obvious present invention of claim 8.

Claim 8 of App.'679 renders obvious present invention of claim 9.

Claims 9 and 13 of App.'679 render obvious present inventions of claims 10 and

Claims 14 and 15 of App.'679 render obvious present inventions of claims 12 and 13.

Claims 19 and 20 of App.'679 render obvious present inventions of claims 14 and 15.

Claim 21 of App.'679 renders obvious present invention of claim 16 because it would have been obvious to one skilled in the art to use the amide surfactant with a reasonable expectation of obtaining a resist pattern.

Claims 22- 24 of App.'679 renders obvious present inventions of claims 17-19.

Claim 26 of App.'679 render obvious present invention of claim 20.

Claim 27 of App.'679 render obvious present inventions of claim 21.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

10. Claims 1-17 and 19-21 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1 and 10-19 of copending Application No. 10/647,247. Although the conflicting claims are not identical, they are not patentably distinct from each other because of the following reasons:

Claim 1 of App.'247 states the following:

1. A method of manufacturing a semiconductor device comprising the steps of:
forming a resist pattern over a base layer;
applying a resist pattern smoothing material onto a surface of the resist pattern, thereafter heating and developing the resist pattern applied with the resist pattern smoothing material so as to form a smoothed resist pattern; and
etching the base layer using the smoothed resist pattern as a mask so as to form a pattern of the base layer,
wherein at least one of an application thickness of the resist pattern smoothing material and a heat temperature for the heating is adjusted so as to smooth at least wall surfaces of the resist pattern.

Claims 10, 12, and 13 of App.'247 furthermore teach that the resist pattern smoothing material of claim 1 comprises a resin, a crosslinking agent, and a non-ionic surfactant, one of which examples include an amide compound. Therefore, claims 1, 10, 12, and 13 of App.'247 would render obvious present inventions of claims 1-3, 16, 17, and 19-21.

Claim 11 of App.'247 renders obvious present invention of claim 4.

Since Claim 13 of App.'247 teaches that more than one non-ionic surfactant can be used, it would have been obvious to one skilled in the art to use an amide compound and an alcohol compound together as the non-ionic surfactant with a reasonable expectation of obtaining the resist pattern smoothing material. Therefore, Claim 13 of App.'247 renders obvious present inventions of claims 5-7.

Claim 14 of App.'247 renders obvious present invention of claim 8.

Claim 15 of App.'247 renders obvious present invention of claim 9.

Claims 16 and 17 of App.'247 render obvious present inventions of claims 10-13.

Claims 18 and 19 of App.'247 render obvious present inventions of claims 14 and

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Response to Arguments

11. Applicants argue that since Vasta's coating composition is wholly cured whereas Ishibashi's material is a resist pattern forming material (and also since the properties of the compositions of Vasta and Ishibashi are completely different), there would be no motivation to combine the teaching of those references.

The Examiner respectfully disagrees. As discussed above, Vasta teaches that a coating composition containing a bicyclic amidine is stable against weather, corrosion and abrasion and specifically states that the bicyclic amidine significantly extends the pot life of the composition. Based on this teaching, it is the Examiner's position that one skilled in the art would have been motivated to include Vasta's bicyclic amidine in Ishibashi's second resist composition in order to stabilize the second resist composition and to increase the pot life of the second resist composition, regardless of the fact that Vasta's coating composition is wholly cured whereas Ishibashi's material is a resist pattern forming material (because those good properties of composition obtained by incorporating Vasta's bicyclic amidine compound would equally exist whether the composition *is to be* wholly or partially cured later).

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sin J. Lee whose telephone number is 571-272-1333. The examiner can normally be reached on Monday-Friday from 9:00 am EST to 5:30 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cynthia Kelly, can be reached on 571-272-1526. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

S. J. Lee

S. Lee
April 27, 2005

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